American POTATO JOURNAL

Volume 31 *June 1954* *Number 6*

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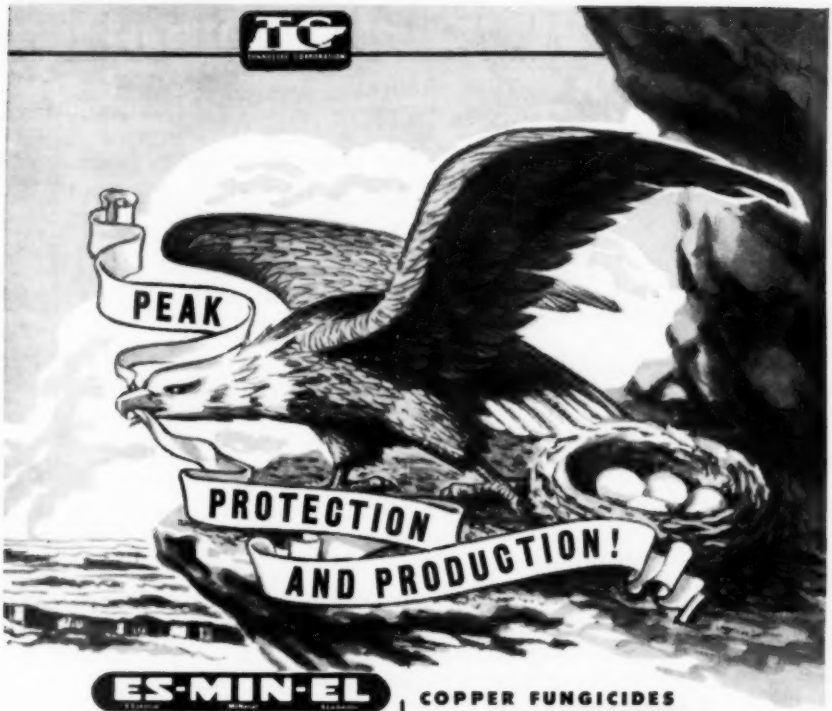
POTATO NEWS AND REVIEWS

Official Organ of

THE POTATO ASSOCIATION OF AMERICA

NEW BRUNSWICK, NEW JERSEY



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American Potato Journal

PUBLISHED BY
THE POTATO ASSOCIATION OF AMERICA
NEW BRUNSWICK, N. J.

Price $4.00 per year in North America
$5.00 in other countries after January 1, 1954

Entered as second class matter at New Brunswick, N. J., March 14, 1942 under Act of March 3, 1879. Accepted for mailing at special rate of postage provided for in section 412, Act of February 28, 1925, authorized on March 14, 1928.

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We welcome the above firms as sustaining members and express to them our appreciation for their interest and financial support.

ANNOUNCEMENT OF ANNUAL MEETING

The Annual Meeting of the Potato Association of America will be held in conjunction with the American Phytopathological Society at Estes Park Conference Camp, Estes Park, Colorado, August 24-28, 1954.

1. LODGING ACCOMMODATIONS:

(a) Lodges and Sleeping Cabins — Rooms for 2 or 4 persons each. For families without children or with 2 small children and individuals who can room together. Indicate any preference for a room mate. No cooking facilities.

(b) Cabins for Families — For families with 2 or more children including families of 4 or more if one child is 11 or older. Cooking facilities in some cabins, however regular conference rate required from head of family plus a slight charge for other family members.

2. DINING ROOM ACCOMMODATIONS:

Three dining rooms available so that all guests may eat at one time.

3. SERVICE — Maid service, towels and all bedding furnished. A hostess shall be in charge of the lodges. Experienced hikemasters, naturalists, guides, horsemen, *etc.,* will be available.

4. RESERVATIONS —

(a) Families (man, wife and children) deadline June 30, 1954. Families with 2 or more children should indicate desire for cabin with cooking facilities if required.

(b) All others must make reservations by July 31.

Send all reservations to Dr. R. H. Porter, Botany and Plant Pathology Department, Colorado A & M College, Fort Collins, Colorado.

5. RATES —

(a) Conference Rates (includes lodging and meals). For adults (12 years and over) $25.00 each; for children (7 to 11 yrs.) $21.00 each; (2 to 6 yrs.) $18.00 each.

(b) Daily Rates (includes lodging and meals). For adults (12 yrs. and over) $6.50; children (7 to 11 yrs) $5.50 each; (2 to 6 yrs.) $4.75 each. All persons attending the meetings of the Phytopathological Society and the American Potato Association, and staying at the Camp will be expected to pay according to the conference rates as listed. Members of families who wish may also pay regular conference rates. Members of families who wish to prepare their own meals may do so, but will be charged a reasonable fee for lodging. In addition, they will pay for the Chuck Wagon dinner if they wish to attend.

(c) The Chuck Wagon Dinner, Wednesday night included in Conference rate. An extra charge will be made for persons who do their own cooking. Their desire to attend this dinner should be noted in reservation request. This will replace the usual banquet.

6. TRANSPORTATION — Purchase railroad and bus tickets to Estes Park; Air line tickets to Denver. The Rocky Mountain Transportation bus serves Estes Park and the Conference Camp.

7. **ENTERTAINMENT** — On Friday afternoon, August 27, arrangements shall be made for a sight-seeing tour into the mountains. We will go to Bear Lake, and up Trail Ridge road (paved) above timberline, to the top-of-the-world at the Continental Divide. This trip, alone, is well worth coming to Colorado to see. Besides the scheduled sight-seeing tour, the following activities will be available for members of families who do not wish to attend the meetings: (1) Hikes over mountain trails led by experienced hikemasters and naturalists. (2) Saddle livery with mountain-trained horses and ponies for children and inexperienced riders, and cowpokes and cowgals. (3) Fishing for trout in a mountain stream is a sport one should not pass up. A visitor's license for three or ten days can be purchased. There are two trout streams close by the camp. (4) Square dancing for all ages. (5) There are a playground and kindergarten cabin for children from 3 to 6 years of age, under experienced kindergarten instructors. (6) Archery, hobby grounds, tennis, riflery, and picnics for teen-agers. (7) Golf privileges, for a reasonable green fee, can be had at the Estes Park Country Club. Check the bulletin board in the Administration Building for scheduled party trips which you can join.

8. **WEATHER** — Normally the days are pleasantly cool, and a typical afternoon mountain shower may last for a few minutes and be over. Estes Park Conference Camp is at an altitude of approximately 8,000 feet, and the nights are always quite cool. Therefore, *bring along a rain coat and a top coat* regardless of how hot the weather is where you live.

9. **CALL FOR PAPERS** — Titles and abstracts of papers for presentation at the meetings of the Potato Association of America should be sent to Cecil Frutchey, Colorado A & M College, Fort Collins, Colorado, by June 24. A joint session with the American Phytopathological Society is planned. Please indicate length of time required for presentation and your need for projectors, *etc.*

RESERVATION — ESTES PARK MEETING

POTATO ASSOCIATION OF AMERICA

AUGUST 25-26-27, 1954

Name .....

Address .....

Number in Party .....

Include Ages of Children .....

Date of Arrival .....

Method of Travel .....

Number Attending Chuck Wagon Dinner .....

Send to **Dr. R. H. Porter, Dept. Plant Pathology, Colorado A & M College, Ft. Collins, Colorado**

THE WITCHES' BROOM VIRUS DISEASE OF POTATOES[1]

N. S. WRIGHT[2]

INTRODUCTION

Potato witches' broom was first fully described and shown to be tuber-perpetuated by Hungerford and Dana (6) in 1924. They reported the occurrence of the disease in the Skagit River Valley of western Washington, the Willamette River Valley of western Oregon, the Snake River Valley of southern Idaho, in northern Idaho and in eastern Washington. The disease was first named and illustrated by Bisby and Tolaas (2) from Minnesota in 1920. The virus nature of the disease was proven by Young (15) in Montana in 1927. This disease has also been reported from North Dakota (3), Iowa (11) and Michigan (4), in the United States, and from western Canada (10), Alaska (9), Poland (12), Russia (7), China (17) and Australia (1). In British Columbia, witches' broom of potato became economically important about 1940 with the expansion of the seed potato industry into the north central districts of the province. In these areas, particularly in the Cariboo district and Prince George, it has become more prevalent than any other potato virus disease.

When potatoes are planted in tuber units, the first symptoms are invariably found on all plants in an affected unit indicating that infection occurs at least one season before symptoms appear. The incidence of witches' broom has varied considerably from year to year in British Columbia. The usual incidence of infection does not exceed 2 per cent, but, occasionally, as in 1941 and 1947, as high as 15 per cent of the plants in one field have been diseased. The reasons for this variability are not known. Certainly the number of visibly infected potato plants which could serve as the source of inoculum has not been sufficiently variable from year to year to account for the variable incidence. There may be a correlation between the prevailing climatic conditions and the amount of transmission that occurs. Circumstantial evidence supports this explanation. Extended periods of hot, dry summer weather were recorded in central British Columbia in both 1940 and 1946 whereas summers in the other years since 1940 have been relatively cool and moist. The effect of extended periods of hot, dry weather in summer is the eventual drying up of grasses, native vegetation and alfalfa stands. If, in these circumstances, insects capable of transmitting the virus migrate from a preferred host to potatoes, the apparent correlation between weather and witches' broom transmission could be explained. To date, however, the vector of the virus is unknown.

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[1]Accepted for publication October 29, 1953.
An invitational paper presented at the Symposium on Potato Virus Diseases at the 40th Annual Meeting of The Potato Association of America in Madison, Wis., September 7, 1953. Contribution No. 1316 from the Botany and Plant Pathology Division, Science Service, Department of Agriculture, Ottawa, Canada.

[2]Associate Plant Pathologist, Canada Agriculture, Science Service, Plant Pathology Laboratory, Vancouver, B. C., Canada.

SYMPTOMS

The symptoms of witches' broom have been described in considerable detail by Hungerford and Dana (6) and by Wright (14). The first foliage symptoms, upward rolling and marginal chlorosis of leaflets, resemble other diseases involving injury to the vascular system, such as rhizoctonia, purple top wilt, and current season infection of leafroll. However, by the time symptoms appear on the leaves, there are invariably some diagnostic symptoms below the ground level. Stolons are unusually white, elongated, and bear numerous small tubers, frequently in chains. Shortly after the first foliage symptoms appear, slender cylindrical stems grow from the newly-formed tubers or from stolons. Plants in advanced stages of infection are distinctly dwarfed, usually chlorotic, and possess many fine, cylindrical stems with leaves that are simple rather than compound as may be observed in figure 1. Such plants produce a large number of small tubers that usually sprout as soon as they are formed.

STRAINS

Potato plants infected with the witches' broom virus usually have characteristic symptoms but, occasionally, plants have been found on which the symptoms are atypical. Variations occur in the degree of chlorosis, the amount of leaf rolling, and in the rapidity with which a plant and its progeny reach the advanced stages of infection. During 1951 and 1952 witches' broom virus, from 13 potato plants with minor variations in symptoms, was transmitted by grafting to U.S.D.A. potato seedling 41956 and thence to tomato, var. Bonnie Best, and tree tomato *(Cyphomandra betacea* Sendt*)*. Even though the symptoms produced on potato were not sufficiently variable to indicate that strains of the virus were involved, three distinct syndromes developed on the tomato, and the 13 sources of virus were similarly separated by the symptoms which developed on tree tomato.

A virus from nine of the 13 sources caused a disease on tomato similar to the disease transmitted to tomato from witches' broom-infected potatoes by Young and Morris (16) and by Kunkel (8). A cessation of normal apical growth occurred in approximately five weeks. Terminal leaflets and rachises became distorted by a downward cupping and rolling and some had very narrow leaf blades or none at all. The growth of normally dormant buds in the axils of leaves, particularly near the top of the plant, was a consistent symptom as seen in figure 2. Flowers and fruit were reduced in size but were otherwise normal. On tree tomato, virus from all sources in this first group caused interveinal chlorosis and downward cupping of apical leaves about five weeks after inoculation. Growth of axillary buds near the apex of the stem produced an extreme witches' broom condition. Leaves on axillary stems were small, mottled, crinkled, and had a tendency to curl downward, which symptoms are clearly shown in figure 3.

Virus from one of the 13 sources, caused on tomato a disease resembling tomato big bud, described from Australia by Samuel, Bald and Eardley (13) and from the northwestern part of the United States by Dana (5). This disease, which became evident about six weeks after

FIGURE 1.—Advanced stage of witches' broom on U. S. D. A. potato seedling 41956.
FIGURES 2 and 3.—The first isolate of potato witches' broom virus on tomato (Figure 2) and on tree tomato (Figure 3).

inoculation, was characterized by etiolated growth and phyllody which is clearly demonstrated in figure 4. Leaf size was reduced but there was no cessation of terminal growth or severe leaf distortion. Growth of axillary stems caused infected plants to have a willowy appearance. Sepals and petals became leafy structures and no fruits were produced. On tree

tomato this second type was characterized by the growth of stems from axillary buds all along the main stem. All leaves on the axillary branches were smooth, uniformly chlorotic and reduced somewhat in size, but there was no mottling, crinkling or extreme hypotrophy as shown in figure 5.

Virus from the remaining three sources caused on tomato a third type of disease differing from the second type by a more intense chlorosis, a greater reduction in size of leaves and a normal development of flowers as shown in figure 5. Like the second type, however, and in contrast to the first, plants grew very tall and willowy and no fruits formed on plants in the advanced stages of infection. On tree tomato, stems developed from each axillary bud. Leaves were smaller than those seen in the second group and lacked the mottling and distortion observed in the first group as noted in figure 7.

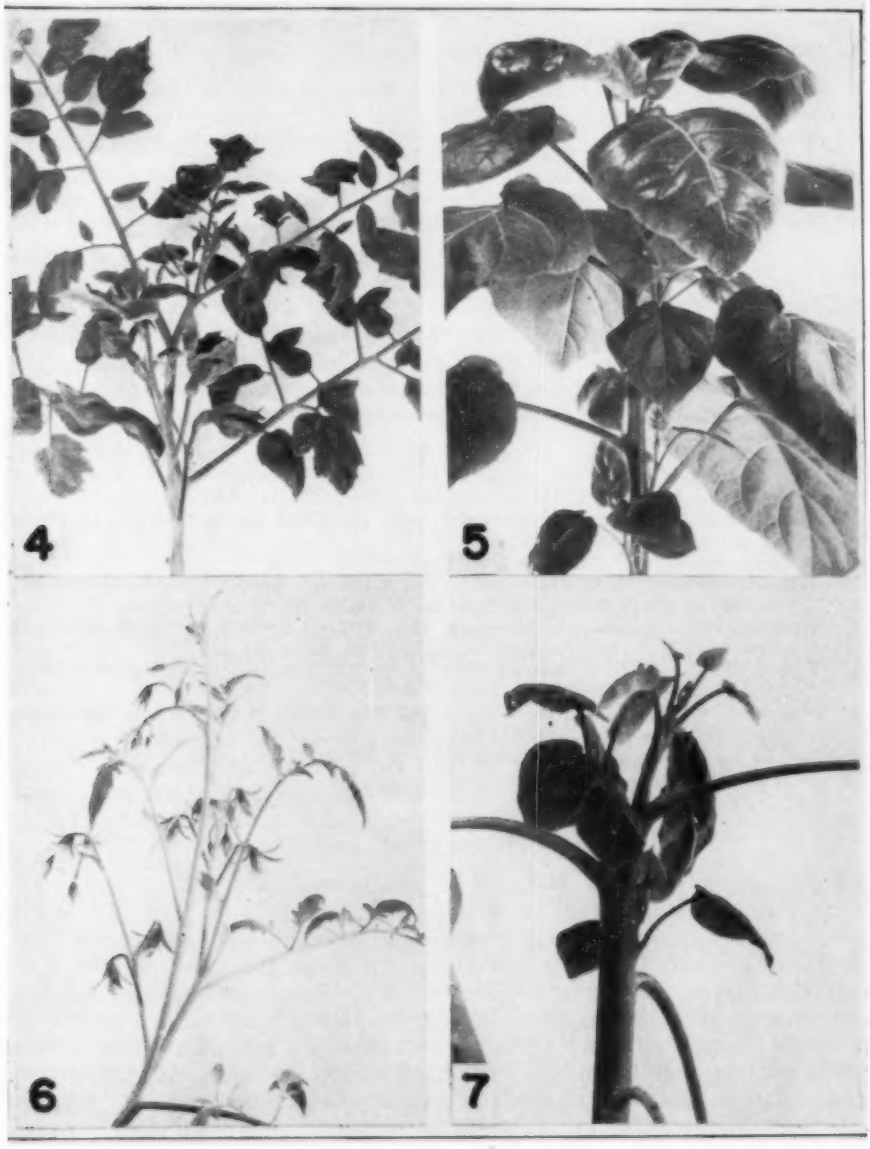
RECOVERY OF INFECTED PLANTS

White Rose potatoes which were inoculated with the witches' broom virus in 1949 have been propagated by tubers in each succeeding year. All inoculated plants showed typical symptoms in 1950 and 1951. By mid-season in 1952 four or five strong stems with normal compound leaves had developed in each plant in addition to the slender, cylindrical stems which are typical of the advanced stage of the disease. Five to 10 normal-sized tubers formed in addition to numerous small ones. Tubers from five such plants were grown in 1953 and the appearance of the plants by mid-season is indicated in table 1. Relatively few (11 per cent) of the plants showed typical witches' broom symptoms. Most plants (64 per cent) showed partial recovery, the same as the 1952 plant selections. About 25 per cent of the plants had normal foliage.

TABLE 1.—*The appearance of plants grown from tubers of partially recovered plants*

Series	No. of Plants	Typical Witches' Broom	Partially Recovered Foliage	Completely Recovered Foliage
1	27	0	8	19
2	43	6	33	4
3	43	7	29	7
4	36	4	31	1
5	10	1	0	9
Total:	159	18	101	40
Per cent:		11	64	25

It was found that the size of the tuber planted did not influence the type of plant produced. All plants, even those with no foliage symptoms



FIGURES 4 and 5.—The second isolate of potato witches' broom virus on tomato (Figure 4) and on tree tomato (Figure 5).

FIGURES 6 and 7.—The third isolate of potato witches' broom virus on tomato (Figure 6) and on tree tomato (Figure 7).

produced an unusually large number of tubers, although the plants with partially or completely recovered foliage produced fewer and larger tubers than those with typical witches' broom symptoms.

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BREEDING FOR RESISTANCE TO LATE BLIGHT[1]

R. V. AKELEY AND R. W. BUCK[2]

It is now more than 100 years since late blight, incited by *Phytophthora infestans,* destroyed many potato crops in Europe and North America and caused the Irish Famine. From that time to the present, research has been conducted intermittently to breed blight-immune varieties. Worthwhile progress has been made, but only partial success can be reported.

In the United States the work of breeding blight-resistant varieties began about the middle of the 19th century. Although many excellent varieties, some of which are grown commercially today, were produced during the last half of the century, none was resistant to late blight. Protective measures that permitted the growing of susceptible varieties were devised and the work of breeding for late blight resistance was allowed to lapse for a time.

In 1910 potato breeding was actively undertaken by the United States Department of Agriculture under the leadership of William Stuart. At that time the only disease resistance sought was to the late blight fungus. However, the work had not progressed far when it became evident that virus diseases had to be given chief consideration, and it was not until 1932 after the National Potato-Breeding Program was under way that emphasis could be placed once more on breeding for resistance to late blight. It seemed advisable at first to study the reaction of the available cultivated varieties and parent material phenotypically and genotypically. many named varieties of *Solanum tuberosum* and thousands of seedling varieties were tested. Various degrees of resistance were found from high resistance to complete susceptibility to the races of the late blight fungus prevalent in Maine at the time.

MATERIALS AND METHODS

Since 1932 the materials used in breeding potatoes resistant to late blight by the United States Department of Agriculture in cooperation with the Maine Agricultural Experiment Station, Presque Isle, Maine, have gone through a number of phases: The testing of American varieties and crosses between some of them to determine their reaction to late blight; the use as parents of foreign varieties showing an intermediate degree of resistance; the introduction of seed of the German *W* varieties possessing a gene for immunity from the common physiologic races, and the use of these varieties as parents in the production of superior commercial varieties highly resistant to, if not immune from, the common races of the late blight fungus; and the use as parents of seedling varieties related to *S. demissum* carrying two or more of its genes for immunity

[1]Accepted for publication December 15, 1953.
An invitation paper presented at the Symposium on Potato Late Blight at the 40th Annual Meeting of the Potato Association of America in Madison, Wis., September 7, 1953.

[2]Senior Horticulturist and Geneticist, respectively, Bureau of Plant Industry, Soils, and Agricultural Engineering, United States Department of Agriculture, Plant Industry Station, Beltsville, Md.

in an attempt to breed commercial varieties resistant to all the physiologic races known at present in the United States.

The methods also have undergone a number of changes. Most of the early tests were conducted in the field at Presque Isle, Maine, and a few were made in the greenhouse at Beltsville, Maryland. The seedling varieties were tested in comparison with the President variety, which is intermediate in resistance, and with Green Mountain, which is extremely susceptible to the disease. In Maine the seedlings usually were grown in 5-hill lots. Each row of 5-hill lots was grown adjacent to a row of Green Mountain. As additional checks Green Mountain, President and the parents of the respective progenies under test were distributed through the field. The plants were sprayed at intervals during July and August with a water suspension of zoospores of the late blight fungus and if the weather was favorable a satisfactory epidemic resulted. In 1936, for example, the leaves of susceptible varieties were killed at least 30 days before the plants would have matured normally.

In the greenhouse at Beltsville, Maryland the humidity of the air was raised almost to the saturation point by the addition of steam just prior to the spraying of the plants with water suspension of zoospores.

Recently most of the tests for blight resistance have been conducted in greenhouses, some at Presque Isle and others at Beltsville. These are made in moist chambers, where a fine spray of water is applied to the plants at regular intervals. The water is automatically controlled by a time clock. In Maine selections from both blight-resistant progenies and seedlings in about the four-leaf stage are sprayed with a water suspension of zoospores of the common races of the late blight fungus.

The most promising survivors from this test are tested again at Beltsville, this time with each of the physiological races that have been isolated from Kennebec and other resistant varieties in Maine.

In other tests at Beltsville, the seedlings related to the *W* varieties and to the species *S. demissum* are sprayed in the seedling flats in about the four-leaf stage with a mixture of all the races mentioned above.

In these tests a fine water spray is applied by hand, the spore suspension is applied with an atomizer, and the flats are covered with glass.

Results

Resistance in Cultivated Varieties. The first indication in the present program that resistance to blight could be found in the cultivated varieties was observed in a cross of two susceptible varieties, Chippewa x Katahdin. A number of selections of this cross were more resistant than either parent. One selection was found to be moderately resistant to late blight in both vines and tubers and as its horticultural characters were satisfactory it was named Sebago and released to growers. It is now an important American variety.

Sebago was back crossed to Katahdin. The mean for the population of 280 seedlings of this back cross indicated a resistance significantly higher than that shown in the Chippewa x Katahdin cross.

When President, which on the average showed a slightly higher degree of resistance than Sebago, was crossed with Katahdin a higher percentage of seedlings showed an intermediate degree of resistance than was found in the Sebago x Katahdin cross. One of the selections of the

President x Katahdin cross was named Saranac and released. Ackersegen, a German variety, was more resistant in the early tests than Sebago or President. A cross between Ackersegen and Katahdin produced a number of seedlings, some of which were more resistant than Sebago. One of these was named Calrose and released to growers in California.

The greatest resistance in this group of crosses was found in a cross between two resistant parents, a seedling of Katahdin selfed and a Japanese variety, Ekishirazu. More than 90 per cent of the seedlings of this cross were resistant but, the tuber shapes were so poor and the yields so low that none of the seedlings could be considered as a commercial possibility.

Resistance in W Varieties. True seed of the *W* varieties, sent to us by K. O. Muller formerly of Berlin Dahlem, Germany, has contributed two characters of great importance to our breeding program: immunity from the physiological races of late blight prevalent in most parts of the United States combined with genes for early maturity. The exact origin of the *W* varieties is not known, but it is supposed that they originated from crosses in which *Solanum demissum* played a part as recent results indicate that they carry a factor for immunity identical with one obtained from *S. demissum*. Seedlings were grown in Maine from the seed received from Germany and subjected to a heavy epidemic of late blight induced by spraying the plants with a suspension of zoospores. Many seedlings came through the tests free from blight, whereas other seedlings and the susceptibile checks were dead as long as 30 days before they would have matured normally. Although many of these seedlings were highly resistant to blight, they were all low in yield and market quality. A few of the best of them were crossed with American varieties. Selections from a cross with Earlaine were among the best. A number of the latter had the resistance of the original *W* varieties, were early, and were self-fertile. They yielded much more than the original seedlings but could not compete in this respect with the best commercial sorts. They were in turn selfed, sib-mated, and outcrossed to various commercial varieties and promising seedlings.

Regardless of the other parent, a number of seedlings that escaped infection with the common races of late blight fungus were found in three resulting progenies.

In this second series of crosses, a number of seedlings were found that combined immunity from the common races of the late blight fungus with high yield, good cooking quality, and satisfactory market quality when grown in Maine. Three of these, Kennebec, Cherokee and Pungo, were named and released. With the release of these and a number of Dr. Reddick's varieties, the blight problem in the United States might have been solved if it had not been for the appearance of new physiologic races of the causal organism.

About 25 years ago it was thought that there was only one biotype of the late blight fungus in North America and it was not until varieties and seedlings related to *S. demissum* were produced and showed various reactions to the disease that different races could be identified.

Varieties such as Kennebec seem to be immune from the common races of the late blight fungus, but they are susceptible to some of the more virulent races.

To get immunity from all races identified in the United States it

seems necessary to work with seedling varieties closely related to *S. demissum*. Multiple genes for immunity found in that species segregate or separate in crosses or back crosses with cultivated sorts. Some of the resulting seedling varieties carry only one of the genes, but others may possess two or three. These seedling varieties are far superior to the wild species in horticultural characters. By the use of these improved seedling varieties as parents, we are attempting to recombine the several immunity genes and to produce commercial varieties with the multiple genes for immunity found in *S. demissum*. Some of the seedlings related to this species have been obtained from Cornell University, at Ithaca, New York, from the Pennsylvania Agricultural Experiment Station at State College, Pennsylvania, from Scotland, and from Germany.

One of the first crosses made in the latest phase of our work was between T15 and B 355-24. T15, one of Dr. Reddick's older seedlings, is five generations from *S. demissum*. It is immune from the common races of late blight and from several of the more virulent races. B 355-24 is immune from the common races.

From the cross B 922 (T15 x B 355-24) 337 seedlings were grown. Of these 23 were selected as having commercial possibilities and tested for their reaction to late blight in the field. Eleven of these showed an immune reaction. Five of the latter escaped infection when inoculated with 6 virulent cultures at Beltsville, Maryland.

The five selections that showed immunity in the tests at Beltsville were sent to Cornell University, where L. C. Peterson tested them with his races B, C, D, BC, and BD. Three selections showed an immune reaction to B, C, D, and BD but not to BC. The other two were free from infection with all 5 races. With the parent material we have on hand we have produced thousands of seedlings apparently immune from the common races of late bilght.

In 1951, 15 crosses and 2 selfed lines were inoculated in the seedling stage with the zoospores of the common races in the greenhouse at Presque Isle, Maine. The data from these tests are given in table 1.

Of the seedlings of B 355-24 selfed 96 per cent showed an immune reaction, but only 38 per cent of those of B 922-3 selfed escaped infection in spite of the fact that B 922-3 is a selection from the cross T15 x B 355-24 and is immune from several of the virulent races. Eighty-four per cent of the seedlings from the backcross B 355-24 x B 922-3 did not become infected and were considered immune.

Of the seedlings of the cross Aquila x Kennebec 81 per cent were immune. Aquila is a German variety related to Muller's blight-resistant *W* varieties and Kennebec inherited its resistance from the same sources. A genetic hypothesis to explain these results has not been attempted, but the data do show that immunity from the common races is not difficult to obtain. Immunity seems to behave as a dominant.

The recent work of breeding for resistance to the more virulent races of the late blight organism is carried on in the greenhouses of the Plant Industry Station, Beltsville, Maryland. During September and October, 1952, the progeny of 60 crosses and 18 selfed lines were screened for resistance to late blight by the junior author and L. C. Cash. The parents of these crosses and selfed lines were obtained from different sources. Some were produced at Beltsville, and others were obtained from W. R. Mills.

TABLE 1.—*Blight reactions of crosses and selfed lines of potatoes inoculated in the seedling stage with the common races of the late blight fungus.*[1]

Parentage	Seedlings Inoculated	Seedlings Resistant	
	No.	No.	Per cent
Essex x B 505-44	763	267	35
Essex x B 606-3	458	294	64
Essex x B 754-16	147	77	52
B 355-24 x B 721-1	333	169	51
B 355-24 x B 1919-15	866	570	66
B355-24 x B 922-3	766	646	84
B 341 x B 919-15	256	201	79
B 778-43 x B 922-3	417	140	34
B 922-4 x B 606-3	200	158	79
B 922-12 x B 919-15	105	11	10
B 931-2 x B 922-4	220	146	66
B 2135-28 x B 922-3	1,435	1,352	94
Aquila x Kennebec	151	122	81
B 920-7 x B 922-5	30	29	97
B 922-5 x B 725-37	53	33	62
B 355-24 selfed	380	366	96
B 922-3 selfed	228	86	38

[1]The inoculations were made in a moist chamber in the greenhouse at Presque Isle, Maine, in 1951.

State College, Pennsylvania, L. C. Peterson, Cornell University, Ithaca, New York, William Black, Plant Breeding Station, Corstorphine, Scotland, and Wm. Rudorf, Max-Planck Institute, Voldagsen uber Elze, Germany.

Seedlings were inoculated with a mixture of zoospores from five isolates of the late blight fungus made by E. S. Schultz from resistant varieties growing in the fields in Maine. The seedlings were inoculated in the seed flats at an early stage of development. The flats were covered with glass and the humidity was kept at a high level by frequent spraying with water from a fine nozzle. Seedlings upon which late blight developed were counted and discarded. Seedlings free from blight were considered resistant, potted, and grown to maturity in 3-inch pots.

A total of 23,446 seedlings from 60 crosses and 3,951 from 18 selfed lines was inoculated. From the crosses 4,414 seedlings, or 18.9 per cent, and from the selfed lines 1,151 seedlings, or 29.9 per cent, were resistant.

As an illustration of the results obtained the data for a few of the crosses and selfed lines are given in table 2.

Kennebec is resistant to the common races and B 922-3 is resistant to several of the virulent races. When these two were crossed only 13.9 per cent of the seedlings were resistant (table 2). However, when B 922-3 was crossed with others that are also resistant to some of the virulent races, the percentage of resistant seedlings was considerably higher, ranging from 34.2 per cent to 51.1 per cent.

B 922-6 is immune from the common races and several of the virulent races but when it was crossed with the very susceptible, Teton, only 0.4 per cent of the seedlings escaped infection. However, when it was crossed with B 2968-31, which is resistant to the common races, 41.9 per cent of the seedlings were resistant to the mixture of common and virulent races.

TABLE 2.—*Results of inoculating seedlings of potato crosses and selfed lines with a mixture of common and virulent races of the late blight fungus, in flats, Beltsville, Maryland, 1952.*

Parentage	Seedlings Inoculated	Seedlings Resistant	
	No.	No.	Per cent
Kennebec (R_1) x B 922-3 (R_2)	301	42	13.9
3 NC-9 (R_2) x B 922-3 (R_2)	231	118	51.1
Ac 25949 (R_2) x B 922-3 (R_2)	231	79	34.2
Ac 25956 (R_2) x B 922-3 (R_2)	152	73	48.0
B 922-6 (R_2) x Teton (S)	576	23	0.4
B 922-6 (R_2) x B 2968-31 (R_1)	460	193	41.9
3 VW-9 (R_2) x B 2968-31 (R_1)	710	280	39.4
S. demissum (R_2) x B 983-9 (R_1)	85	80	94.1
B 922-3 (R_2) selfed	189	55	29.1
B 922-6 (R_2) selfed	29	28	96.5
Ac 25949 (R_2) selfed	240	148	61.7
Ac 25956 (R_2) selfed	95	82	86.3
3 VW-9 (R_2) selfed	231	145	62.8

R^1 = Resistant to the common races.
R^2 = Resistant to some of the virulent races.
S — Susceptible to all races.

A first generation hybrid between *S. demissum* and B 983-9 gave the percentage of resistant seedlings found in the crosses, 94.1.

The five selfed lines, the parents of which are resistant to some of the virulent races, produced resistant seedlings ranging from 29.1 per cent for B 922-3 to 96.5 per cent for B 922-6.

The results in these tests are promising, but they are by no means final.

The tubers of most of the resistant seedlings of the crosses and selfed lines were sent to John S. Niederhauser, the Rockefeller Foundation, Mexico City, Mexico, who gave a report on these seedlings later in the symposium, but according to a preliminary report received from him they did not show much promise in his tests.

From reports received it is evident that some of the races found in Mexico are more virulent than those found thus far in the United States.

The new races have given breeding for resistance to late blight a set-back, but progress has been made despite many complications. This is evident in our greater knowledge of the heritance of blight immunity and in the information that we have on physiologic specialization in the causal fungus.

We have released to growers a number of varieties with an intermediate degree of resistance and others apparently immune from the common races, such as Cherokee, Pungo and Kennebec. These varieties may be grown in Maine for years before the newer races build up to the point where regular fungicidal treatments are needed. Cherokee, Pungo and Kennebec have been tested in Maine for 13-years and no changes in their reactions to the late blight races prevalent in Maine have been noted.

Many tests and observations to this effect have been made. As an illustration one of these tests will be given in detail.

The year 1951 was very favorable for late blight in Maine and fields

of susceptible varieties were severely injured despite attempts to control the disease with fungicides. That year six varieties, Katahdin, Sebago, Green Mountain, Cherokee, Pungo, and Kennebec, were tested to determine their reactions to late blight, with or without sprays.

A split block 4 x 4 latin-square design was used with four treatments: tri-basic copper, tri-basic copper + DDT, DDT, and no spray. The Teton variety unsprayed was interspaced in paired rows throughout the entire plot after every third row of the varieties being tested. This helped to prevent spray drift and wheel damage to the vines and provided a susceptible host throughout the plot on which a late blight epidemic could be built up. Inoculation was made on July 16 by placing potted Green Mountain that had been heavily infected with late blight between the paired rows of Teton. The weather was favorable and heavy infection was soon present on the susceptible Teton and other susceptible varieties in the unsprayed replications. The spray treatments were applied 11 times at weekly intervals during the season. The yields of U. S. No. 1 tubers are given in table 3.

On Katahdin, Sebago, and Green Mountain tri-basic copper + DDT produced significant increases in yields per acre above those of plots sprayed with DDT alone. Tri-basic copper alone increased yields of Green Mountain over the unsprayed plots, but with Katahdin and Sebago the increases were not significant. On Cherokee, Pungo and Kennebec, however, the yields of the plots sprayed with tri-basic copper + DDT were not significantly different from those of the plots receiving DDT alone; also the plots of those varieties sprayed with tri-basic copper did not yield significantly more than the unsprayed plots. This indicates that when a severe epidemic is caused by the races of the blight prevalent in Maine, Cherokee, Pungo and Kennebec produce as high yields without the application of a fungicide as they do when one is applied. However, an insecticide is beneficial on all varieties.

TABLE 3.—*Yields of six varieties of potatoes given different treatments in a field artificially infected with late blight, Maine, 1951.*

	Yield of U. S. No. 1 Tubers per Acre						
Spray Treatment	Katahdin	Sebago	Green Mountain	Cherokee	Pungo	Kennebec	Mean
	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.
Tri-basic copper ..	516	483	608	623	618	618	558
Tri-basic copper + DDT..	556	600	645	640	647	773	644
DDT	453	423	537	660	655	780	585
None	418	411	495	569	604	693	532
Mean	486	479	571	623	631	732	587

L.S.D. at 5 per cent level for two varieties with same treatment = 88.1 bus.
L.S.D. at 5 per cent level for two treatments on same variety = 99.5 bus.

Discussion and Conclusion

Frequent epidemics of late blight occur in Maine in spite of the improved equipment and fungicides devised to control the disease. As recently as 1951, heavy losses from late blight occurred in that state. Rains interfered with spray operations at times when they should have been performed. The results were that fields of susceptible varieties, such as Irish Cobbler and Green Mountain, were killed by blight before they produced maximum yields and there was an additional loss from blight rot in the tubers in storage. These losses contributed to the shortage of potatoes in the spring of 1952.

Under the conditions that prevailed in 1951 the value of blight-resistant varieties was clearly demonstrated since Kennebec was grown on hundreds of acres and there were few authentic reports of injury to this variety.

The work of breeding for resistance to late blight as summarized in this paper shows continued progress from the susceptible varieties with which the work started; through the intermediate classes of resistance represented by Sebago, President, and Ackersegen; to the immunity from the common races characteristic of the *W* varieties; and to the immunity from some of the more virulent races found in seedling varieties closely related to *S. demissum*.

With our improved breeding material, our increased knowledge of the breeding behavior of the several characters involved, our greater knowledge of the causal fungus, and our improved technics, future progress should be much more rapid, and in the near future we should have varieties possessing at least the multiple genes for immunity found in *S. demissum* combined with the most desirable characters of the best commercial varieties.

SELECTIVE AND NON-SELECTIVE BUYING IN ACCEPTANCE TESTS OF POTATOES[1]

F. A. Krantz[2]

Acceptance studies on potatoes have been made to secure information on consumer preferences and aversions to certain qualities and characteristics. This information is useful to growers, processors, distributors, and those engaged in the improvement of production practices and varieties, for one of their major objectives is to supply potatoes satisfactory to the

Accepted for publication November 11, 1953.

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consumer. In acceptance tests, sales of a sample may represent either selective or non-selective buying or a combination of both. This paper deals with the importance of separating the two types of buying in acceptance tests, and their methods of separation. The data used in this discussion are taken from reports and publications (1, 2, 3, 4, 5, 6, 7, 8,) of studies made by the Northcentral Regional Potato Marketing Research Committee.

Acceptance of Color

Sales of two red varieties and one white variety for four weeks in four retail stores at St. Louis (6) were, in per cent of the total, as follows:

Triumph 34 (red)	White Cloud 30 (white)	Progress 36 (red)

Two widely divergent interpretations can be made: (1) it can be assumed that all sales are due to selective buying, and hence the per cent of total sales indicated for each lot represents their comparative preference by the retail purchasers, or, (2) it can be assumed that none of the sales was due to selective buying, that color—red or white—was immaterial to the purchaser, and since the data agree with that expected from non-selective (random) buying the results supply no evidence indicating selective buying or preferences for either red or white potatoes. Under the first assumption, if offerings were limited to one red and one white sample, expected sales would be 70 per cent red and 30 per cent white; under the second assumption, expected sales would be 50 per cent red and 50 per cent white. If offerings were two white to one red, one could expect under the first assumption, sales of 70 per cent red and 15 per cent for each of the two white samples, and under the second assumption thirty three and one third per cent for each of the three samples. A test to determine which of these two assumptions was valid was made in St. Paul.

Sales, with offerings of two reds and one white for one week in two sets of three retail stores each, at St. Paul, Minnesota (4) were as follows:

Variety	Color	Sales Pounds	Variety	Color	Sales Pounds
Pontiac	red	275	Triumph	red	490
Triumph	red	218	Waseca	red	520
Chisago	white	255	Cobbler	white	220

These results are similar to those obtained in St. Louis except in the sales of Cobbler whose condition was rated by the supervisors "fair to poor" compared with "good" for the Triumph and Waseca. In the same six retail stores, with offerings of one red and two whites the sales were as follows.

Variety	Color	Sales Pounds	Variety	Color	Sales Pounds
Red Warba	red	490	Red Pontiac	red	600
Cobbler	white	535	White Cloud	white	780
Chisago	white	475	Chisago	white	850

Reversal in the number of offerings to two whites to one red reversed the amount of sales of reds to whites. Further tests were made in these stores using two offerings, a red and a white. Sales were as follows:

Color	Variety	Sales Pounds	Variety	Sales Pounds	Variety	Sales Pounds
Red	Pontiac	245	Red Warba	180	Waseca	380
White	Cobbler	205	Cobbler	150	Chisago	360

The deviation in these tests from the expected under non-selective (random) buying was within the error of the test. If significant deviation had been obtained, then the amount of sales due to selective buying of reds and of whites could have been calculated from the deviations. One can conclude that there was no significant selective buying of either reds or whites in these color tests in St. Paul.

A test in Lincoln, Nebraska (8) with offerings of two reds and one white in six retail stores for a three-week period gave sales as follows:

	Progress (red)	Triumph (red)	White Cloud (white)
Per cent total sales	25,104	15,223	10,503
Total pounds sold	49	30	21

The differences in sales between the Progress and Triumph was twice as large as between the Triumph and White Cloud. This indicates the presence of a factor or factors which had a greater influence on sales than color. These factors may be the source of all the differences in sales obtained between the varieties. Further information is needed before any inference can be made on the influence of color on sales in this test.

Sales of potatoes with very good appearance (A), and good appearance (B) in three tests, each for one week in three retail stores in St. Paul, are given in table 1. A direct comparison of A and B gave 9.6 per cent selective buying in favor of A. Test 2 of A-B-B and Test 3 of A-A-B resulted in proportionate sales for each class that agreed with the assumption that the remaining 90.4 per cent was composed of non-selective buying. If the obtained sales had departed appreciably from that expected on the basis of 9.6 per cent selective and 90.4 per cent non-selective buying, one could have estimated the additional selective buying by the "method of maximum likelihood".

TABLE 1.—*Sales of potatoes of very good appearance (A), and good appearance (B), in offerings of A-B, A-B-B and A-A-B.*

Type of Tests	Sales Obtained Appearance				Sales Expected with 9.6 Per cent Selective Buying for A Appearance			
	Very Good		Good		Very Good		Good	
	A	A	B	B	A	A	B	B
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
A-B	—	54.8	45.2	—	—	54.8	45.2	—
A-B-B	—	38.9	29.2	31.9	—	39.7	30.1	30.1
A-A-B	34.1	37.9	28.0	—	34.9	34.9	30.1	—

Acceptance of Grades

Three grades of potatoes, U. S., fancy, U. S. No. 1 (2 per cent defects), and U. S. Commercial (5 per cent defects) were offered at the same price in six retail stores in St. Paul, Minneapolis (5). Sales in per cent of total sales were as follows:

Grade	Stores					
	A	B	D	E	C	F
U. S. Fancy	32.8	33.8	38.5	32.4	41.0	43.3
U. S. No. 1	33.2	33.5	26.0	31.0	39.3	35.6
Commercial	34.0	32.7	35.5	36.5	19.7	21.1

Sales in stores A, B, D, and E indicateed non-selective buying and in stores C and F possibly some selective buying. When the price of U. S. No. 1 and Commercial was reduced from 43 to 39 cents per 10-pound bag, in three stores, the following sales were obtained:

	Sales in Per cent at Indicated Stores			
	Price	E	C	F
U. S. Fancy	$0.43	26.3	22.2	30.9
U. S. No. 1	0.39	38.7	38.9	30.1
U. S. Commercial	0.39	35.0	38.9	39.9

In this test with prices the same for U. S. No. 1 and U. S. Commercial, sales of these two lots did not differ significantly, in any of the three stores. This may indicate that the differences between these two lots obtained in stores C and F in the previous test may have been due to factors other than selective buying. One may logically infer from the tests that buying was non-selective in respect to stores. For if any of the sales of the fancy grade were due to selective buying, the sales would have been significantly higher than for the other two grades, unless one makes the illogical assumption that an equal amount of selective buying was in favor of the lower grades.

Acceptance of Russeting

A two-week test of sales of the Russet Burbank from Idaho and the Russet Burbank, Russet Sebago and Sebago from Wisconsin was made in four retail stores in St. Louis (7). Sales in per cent were as follows:

Variety	Source	Sales
Russet Burbank	Idaho	39
Russet Sebago	Wisconsin	23
Sebago (smooth)	Wisconsin	20
Pontiac	Wisconsin	18

Differences in sales of the varieties from Wisconsin were not significant, judged by the variance in sales of the varieties in different weeks and in different stores. The difference between the average sales of the

varieties from Wisconsin and the Russet Burbank from Idaho is 18.7 per cent of the total sales. This is the amount of selective buying indicated by the test, the other 81.3 per cent could have been at random by consumers who considered all four lots equally acceptable. Further tests of the type outlined for color would have to be conducted before one could conclude that there was no selective buying for smoothness and russeting and that 18.7 per cent of total sales also represents all the selective buying of the Russet Burbank (Idaho). However, for each one per cent additional over 18.7 per cent in favor of Russet Burbank (Idaho) a three per cent selection unfavorable to the variety would have to be present in order to have agreement with the proportionate sales obtained.

Acceptance of Other Characters

Tests were made in St. Paul of seven lots of potatoes U. S. No. 1 grade, differing in varietal and other characters (4). The lots were tested in combinations of three per week in each of these stores until each lot had been tested against each of the other six lots. To complete the test within a reasonable period, two sets of three stores each were used. The average increase or decrease in sales of each lot from the average of the other six lots was as follows:

Variety	Sales Difference in Per cent	Appearance
Russet Burbank	8.27*	Very good
Red Warba	7.25	Very good
Red Pontiac	2.57	Very good
Waseca	.38	Good
Triumph	—1.90	Good
Chisago	—1.93	Good
Cobbler	—14.63	Fair

*Method of calculation: The difference in the number of pounds of the Pontiac group and the number of pounds of the Red Warba group sold when in competition with each other was determined. This difference was divided by the combined total pounds of these two groups sold when in competition with each other. The sales position of the Pontiac group with respect to each of the other variety groups was likewise calculated. This gave the (plus or minus) sales position of the Pontiac group with each of the other variety groups. These sales position percentages were then added, and divided by 6 to determine the average sales position of the Pontiac group. The same procedure was followed with the other six variety groups.

The difference between any two of the lots is the difference in the amount of selective buying in favor of one or the other lot. Thus the difference between Pontiac and Cobbler is 8.27 minus -14.63 or 22.9 per cent of the total sales of these two lots.

The amount of selective buying was closely associated with the inspectors rating of the appearance of the potatoes in the offerings. Some exceptions were found. The Red Pontiac with tubers mostly large (2½" to 4" in diameter) was rated by retailers as the choice lot at the beginning of the test and the Red Warba near the bottom in desirability caused by the irregular surface and mostly small size (1⅞"—3" in diameter).

Selective buying was in favor of the small size. In this case the desired size more than offset the undesirable uneven surface.

The poor appearance of the Cobbler was caused mostly by greening. The rough, uneven surface of tubers may have been partly responsible for the low sales.

Acceptance of Size

Acceptance of size was extensively studied in retail stores in Chicago (1, 2, 3). The importance of separating the selective from the non-selective buying was not appreciated at the time. Consequently, the results supply rather limited information until further tests are made separating the two types of buying. The following discusion of the results illustrates this point.

Average sales of small (1⅞"—2¼"), medium (2¼"—3") and large (3"—4") potatoes were 20, 44, and 36 per cent of total sales, respectively (1, 2, 3). Proportional sales were the same for the above size classes when the assorted class (1⅞"—4") was included in the offering.

Forty per cent selected either medium or large in preference to small. Of this 40 per cent, eight per cent preferred medium over large. The remaining 60 per cent was wholly or partially selective or non-selective. If any of this remaining 60 per cent was composed of selective buying, it would have to be equally distributed over the three sizes. For example, if ten of the twenty per cent of purchases of the small size was selective, then one would have to assume an additional 10 per cent of selective buying for each of the medium and large class in order to secure agreement with the results obtained.

Conclusions

Purchasers in acceptance tests may be selective, non-selective or a combination of both types. Non-selective buying predominated in the tests where the two types of buying were separated. It is of equal, if not greater, importance to know the extent to which two or more products are equally acceptable as to know the extent of preference which exists for each product. The method of testing which will permit a separation of the two types of buying is indicated.

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THE EFFECT OF WEED COMPETITION AND PRUNING OF ROOTS ON THE PHYSIOLOGICAL ONTOGENY OF THE POTATO CROP[1]

M. A. Moursi[2]

INTRODUCTION

Although the growth of potato has been investigated by several workers (1, 3), the problem needs further study. However, the growth and development of a plant is a result of a number of ontogenetic processes. These are the directed and accumulated metabolic reactions. In 1933, Needham (7) classified the ontogenetic processes as follows:

1—Growth which includes the change of the shape, size or weight.

2—Change in structure and organization which represents morphological and differential changes of all kinds. It includes also, the change in the relative proportion of organs.

3—Metabolism which consists of chemical reactions proceeding in the organism and resulting in the formation of new material. These processes of growth and changes in structure and organization can be regarded as a reflection of the metabolism.

The interaction of pruning of roots and weed competition with the growth of the potato crop was investigated.

MATERIALS AND METHODS

There were three treatments in this study:

1—Pruning of roots 4″ from the plant to a depth of 4″. In this case, roots were pruned by a spade on the 3rd, 11th and 26th of June. The weeds were also hand-pulled.

2—Weeds were allowed to grow and compete with the crop.

3—Weeds were pulled by hand on the 3rd, 11th and 26th of June.

The difference between the 1st and 3rd treatment lies solely in pruning of roots.

These three treatments were arranged in randomized block system in 6 replicates. There were 18 plots and every plot consisted of 4 ridges, 27″ apart and 60′ in length. Red skin variety was planted 14″ apart on 21st of April 1952, at Edinburgh Agr. Exp. Farm.

Samples which were selected at random, were 4 plants from every plot of the experiment. Samples were taken on the 16th of June, on the 1st, 14th and 28th of July. Plants that were adjacent to plants selected at previous sampling, were excluded. Edge plants and guard rows were excluded from sampling. The dry weight of the different parts of the plant, such as tubers, leaves, *etc.*, was determined. The drying was carried out in an electric oven with ventilation for 24 hours at 100° C.

The relative growth rate (R.G.R.) was calculated on the following dates:

[1]Accepted for publication November 2, 1953.

[2]Vegetable Crop Department, Alexandria University, Alexandria, Egypt.

1—From 16th June to 1st July (1st interval).
2—From 1st July to 14th July (2nd interval).
3—From 14th July to 28th July (3rd interval).

The relative leaf growth rate (R.L.G.R.) and the net assimilation rate (N.A.R.) were computed for the 1st and 2nd intervals only.

The R.G.R. was estimated by Blackman's Formula: $\frac{\text{Log } W_2 - \text{Log } W_1}{t_2 - t_1}$ (2) where, W_1 = the dry weight of the plant at t_1 (the beginning of the interval. W_2 = the dry weight of the plant t_2 (the end of the period).

The R.L.G.R. is analogous to the R.G.R. and was calculated by the following equation: $\frac{\text{Log } L_2 - \text{Log } L_1}{t_2 - t_1}$, where L_1 = the dry weight of leaves per plant at t_1 (the beginning of the interval). L_2 = the dry weight of leaves per plant at t_2 (the end of the interval).

N.A.R. is the rate of increase in the dry weight of a plant per unit of active growing material. The growing material includes any attribute of the plant which is primarily relevent to carbon assimilation. The carbon assimilation is usually expressed in leaf area basis (4), but because of the difficulty of the estimation of the leaf surface of field crops, leaf weight is substituted for leaf area in the N.A.R. equation (5, 6);

$$E = \frac{W_2 - W_1}{t_2 - t_1} \times \frac{\text{Log } L_2 - \text{Log } L_1}{L_2 - L_1}$$ where,

E = N.A.R.
W_1 = weight of the plant at t_1 (the beginning of the interval).
W_2 = weight of the plant at t_2 (the end of the interval).
L_1 = weight of leaves at t_1.
L_2 = weight of leaves at t_2.

N.A.R., R.G.R. and R.L.G.R. were calculated for individual plots of the experiment. Then, they were subjected to the proper statistical analysis. The results obtained are given in tables 1, 2, 3, and presented graphically in figure 1.

Figure 1 shows the R.G.R. for the plants of the different treatments. The mean value for each sampling interval is plotted at the midpoint of the interval. The vertical line, at the side of the figure, represents the magnitude of differences between means for different intervals and different treatments which are significant at the 5 per cent level. The vertical line is given by $\sqrt{2}$ t x S. E. of the means, where it has the value appropriate to the number of degrees of freedom on which the estimation of the S.E. is based.

Results and Discussion

The results, given in table 1 and figure 1, show that the R.G.R. falls with time. This is due to the decreasing difference between the rate of assimilation and the rate of respiration per unit dry weight; since the R.G.R. is almost equal to the difference between the rates of assimilation and respiration unit dry weight.

The R.G.R. of the pruned-root treatment at the 2nd interval was more than that at the 1st interval. The pruning of roots, checked the growth and resulted in a decrease of the R.G.R. Afterwards, pruned-root plants resumed their activities and the R.G.R. increased.

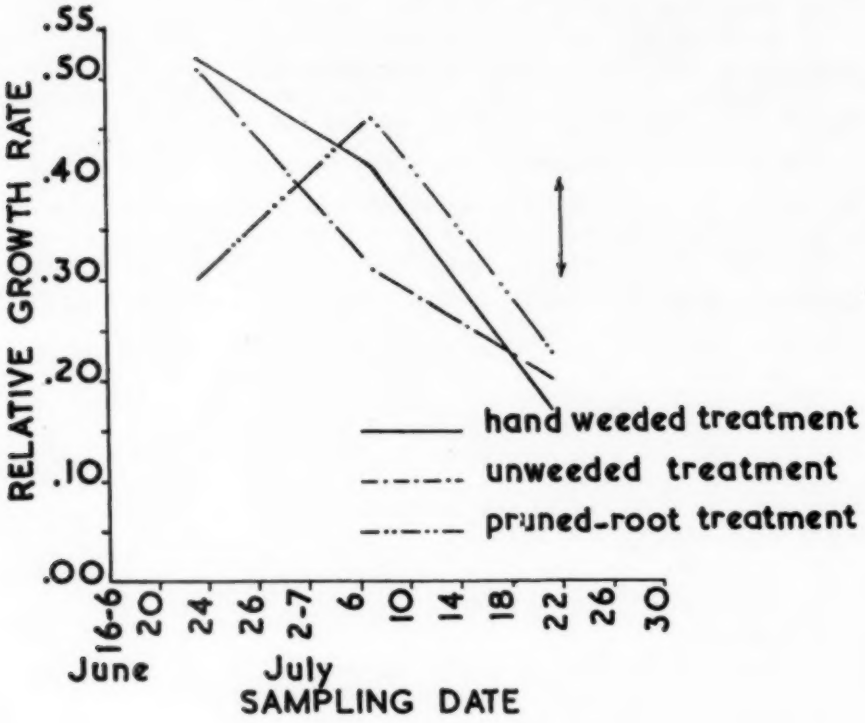

Fig. 1. Curves of relative growth rate (gm. per gm. per week) of potato

On the 1st interval, the R.G.R. of unweeded and hand-weeded treatments was bigger than that of pruned-root treatment. This is a result of check of growth caused by the pruning of the roots. The R.G.R. of the unweeded treatment was slightly less than that of the hand-weeded treatment, owing to the competition of weeds with the crop.

On the 2nd interval, R.G.R. of the pruned-root treatment exceeded the R.G.R. of the other treatments.

On the 3rd interval, the R.G.R. was nearly the same for the three treatments.

Relative Leaf Growth Rate

The values given in table 2 show that the R.L.G.R. declined with time owing to the translocation of assimilates to build the other organs of the plant such as, stolons, tubers, stems, *etc.*

The pruned-root treatment had the smallest R.L.G.R. at the 1st interval, owing to the restriction of growth which resulted from pruning of roots. On the 2nd interval, it resumed its activity and its R.L.G.R. caught up with the R.L.G.R. of the hand-weeded treatment and exceeded that of the unweeded treatment.

TABLE 1.—*Relative growth rate (Gms. per-gm. for 7 days)*

Period of Sampling	Unweeded Treatment	Hand-weeded Treatment	Pruned-root Treatment	Mean
16th June — 1st July	0.5083	0.5154	0.2946	0.4394
1st July — 14th July	0.3071	0.3071	0.4586	0.3912
14th July — 28th July	0.1999	0.1704	0.2273	0.1992
Mean	0.3384	0.3640	0.3268	

L.S.D. for period of sampling at 5 per cent level = 0.0656
L.S.D. for treatment at 5 per cent level = 0.0656
L.S.D. for treatment period of sampling interaction at 5 per cent level = 0.1136

TABLE 2.—*Relative leaf growth rate (Gms. per-gm. for 7 days)*

Period of Sampling	Unweeded Treatment	Hand-weeded Treatment	Pruned-root Treatment	Mean
16th June — 1st July	0.3843	0.4375	0.3506	0.3908
1st July — 14th July	0.1141	0.1692	0.2653	0.1828
Mean	0.2492	0.3033	0.3079	

L.S.D. for period of sampling at 5 per cent level = 0.0608
L.S.D. for period of sampling treatment interaction at 5 per cent level = 0.1054

NET ASSIMILATION RATE

The N.A.R. increased with time during this phase of the potato growth (the 3rd month after planting), although the difference failed to reach the significant level as shown in table 3. The N.A.R. of treatments are arranged in descending order as follows: hand-weeded, pruned root and unweeded treatment. The difference between any two of them did not reach the 5 per cent level of significance.

TABLE 3.—*Net assimilation rate (Gms. per-gm. for 7 days)*

Period of Sampling	Unweeded Treatment	Hand-weeded Treatment	Pruned-root Treatment	Mean
16th June — 1st July	0.797	0.971	0.844	0.870
1st July — 14th July	0.723	1.143	1.142	1.002
Mean	0.760	1.057	0.993	

L.S.D. for period of sampling at 5 per cent level = 0.2525
L.S.D. for treatment period of sampling interaction at 5 per cent level = 0.4369

THE EFFECT OF AGE ON NET ASSIMILATION RATE, RELATIVE GROWTH RATE AND RELATIVE LEAF GROWTH RATE

Physiological processes change with age, and these changes are of important interest. The results show, as stated above, that the N.A.R. per unit leaf weight estimated between the 16th of June to the 1st of July and the first of July to the 14th of July had no drift with time. On the other hand, R.L.G.R. declined significantly with time. Because N.A.R. had no downward trend during this phase of growth, the fall in R.L.G.R. implies that an increasing proportion of the products of photosynthesis as time proceded was used for tubers and stems.

The R.G.R. showed a downward trend with time. This is a result of a decreasing proportion of the plant weight consisting of assimilating material. The foliage dry weight to the total dry weight of the plant multiplied by 100 was as follows:

69.4 on June 16th, or 57 days after planting.
71.2 on July 1st, or 72 days after planting.
47.9 on July 14th, or 85 days after planting.
39.3 on July 28th, or 99 days after planting.

Summary

The effect of weed competition with the potato crop and pruning of roots on R.G.R., R.L.G.R. and N.A.R. was investigated. Pruning checked the growth of plants, the R.G.R. and R.L.G.R. were decreased; then plants rebuilt their roots and resumed their activities.

Weeds competed with the crop and resulted in a slight reduction of R.G.R. and R.L.G.R. Net assimilation rate of different treatments are arranged in descending order as follows: hand-weeded, pruned root and unweeded-treatments. The difference between any two of these treatments did not reach the 5 per cent significant level.

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POTATO NEWS AND REVIEWS

POTATO RESEARCH MEN CONFER IN WISCONSIN

R. W. HOUGAS[1] AND R. H. LARSON[2]

NORTHERN WISCONSIN MEETINGS

From August 30 to September 4, 1953, sixty-three potato specialists from the United States and abroad met in a series of laboratory and field conferences in the northern seed potato area of Wisconsin. These conferences, scheduled immediately prior to the formal meeting of 19 associate and affiliate societies of the American Institute of Biological Sciences, provided an insight to potato field research and commercial potato production in Wisconsin.

The group assembled at the Trees for Tomorrow Camp just north of the village of Eagle River. With the Camp as a center of operations, field meetings were held on

August 31 —

Morning session: The State Potato Foundation Seed Farm near Three Lakes. Dr. H. M. Darling presented a discussion of the history, work and progress of the foundation seed farm. Tubers of the varieties grown as foundation seed were shown.

Afternoon session: The State Potato Breeding Farm near Rhinelander. Dr. G. H. Rieman reviewed the work in progress pertaining to the breeding program. The North Central Region varietal trials were of special interest. Hills of the potential new varieties under test from the North Central States were dug and discussed.

September 1 —

Morning session: Starks Farms, Inc. at Starks. Variety testing for symptom and resistance reaction to *Verticillium Wilt* was demonstrated and discussed by Mr. Melvin Rominsky and Dr. R. H. Larson. An excellent tuber-display of standard varieties, new introductions, and seedling varieties being grown on Starks Farms was of much interest to the group.

Afternoon session: Tours were made to several large commercial field harvesting operations, warehouses and new potato chip plant. Members of the tour were provided a fine, home-cooked lunch by Starks Farms, Inc. and were late-afternoon guests at the Sugar Camp Lodge of Red Dot Foods, Inc.

On September 3, the group assembled at the Inter-regional Potato Introduction Laboratory near Sturgeon Bay. The morning was spent in touring and discussing the field plantings of wild and cultivated potatoes. The afternoon was devoted to a discussion of the technical work under

Accepted for publication March 26, 1954.

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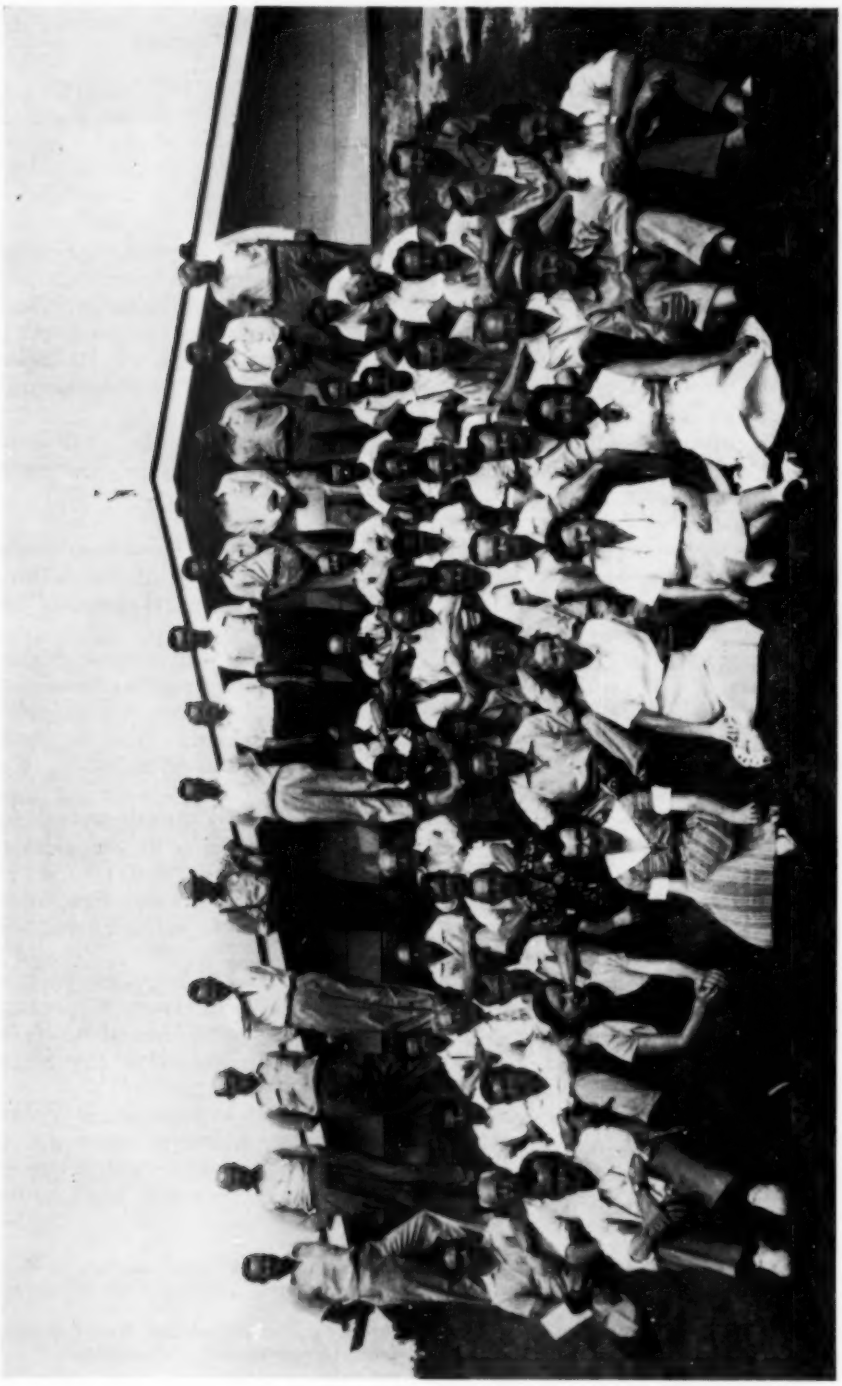

FIRST ROW — LEFT TO RIGHT

1. Larson, R. H. ..... Wisconsin
2. Olmsted, Mrs. D. ..... Minnesota
3. Williams, Bette J. ..... Wisconsin
4. Beamish, Kay I. ..... Wisconsin
5. Walker, Ruth I. ..... Wisconsin
6. Brown, Lily ..... Peru
7. Niederhauser, J. S. ..... Mexico
8. Young, L. C. ..... Canada

SECOND ROW — LEFT TO RIGHT

1. Muncie, J. H. ..... Michigan
2. Krantz, F. A. ..... Minnesota
3. Ross, R. W. ..... Wisconsin
4. Dearborn, C. H. ..... Alaska
5. Smith, Ora ..... New York
6. Magruder, Roy ..... Washington, D. C.
7. Cochran, F. D. ..... North Carolina
8. Munro, J. ..... Canada
9. Dionne, L. A. ..... Canada
10. Johansen, D. ..... North Dakota

THIRD ROW — LEFT TO RIGHT

1. Castronovo, A. ..... Argentina
2. Ochoa, C. ..... Peru
4. Gallegly, M. E. ..... West Virginia
5. Olmsted, D. ..... Minnesota
6. Akeley, R. V. ..... Maine
7. Cook, A. A. ..... South Dakota
8. Young, D. A. ..... Wisconsin
9. Sinclair, J. B. ..... Wisconsin
10. Wade, E. K. ..... Wisconsin

FOURTH ROW — LEFT TO RIGHT

1. Deslandes, J. A. ..... Brazil
2. Hooker, W. J. ..... Iowa
3. Haas, A. J. ..... Wisconsin
4. Steere, R. L. ..... California
5. MacLeod, D. J. ..... Canada
6. Silberschmidt, K. M. ..... Brazil
7. Swaminathan, M. S. ..... India
8. Mills, W. R. ..... Pennsylvania
9. Cervantes, J. ..... Mexico
10. Parks, N. M. ..... Canada

FIFTH ROW — LEFT TO RIGHT

1. Hodgson, W. A. ..... Canada
2. Thompson, N. R. ..... Michigan
3. Clanahan, D. L. ..... Michigan
4. Hougas, R. W. ..... Wisconsin
5. Jones, E. D. ..... Wisconsin
6. Callahan, K. L. ..... Wisconsin

SIXTH ROW — LEFT TO RIGHT

1. Hoyman, W. G. ..... North Dakota
2. Merker, A. E. ..... Washington, D. C.
3. Vincent, C. L. ..... Washington
4. Wright, N. S. ..... Canada
5. Ayers, G. W. ..... Canada
6. Hodge, W. H. ..... Maryland (USDA)
7. Stevenson, F. J. ..... Maryland (USDA)
8. Black, W. ..... Scotland
9. Thurston, H. D. ..... Minnesota
10. Eide, C. J. ..... Minnesota
11. Johansen, R. H. ..... North Dakota
12. MacLachlan, D. S. ..... Canada
13. Cullinan, F .P. ..... Maryland (USDA)

way. Four laboratory demonstrations involving studies of the tuber-bearing Solanum species (*i.e.*, species hybridization, cytogenetics, the use of colchicine in potato breeding, herbarium collections, *etc.*) were presented by Dr. Ruth Walker, Miss Katherine Beamish, Miss Bette Williams, Mr. Roman Ross, Dr. M. S. Swaminathan and Dr. R. W. Hougas.

The group met briefly at the Potato Introduction Station on the morning of September 4 and then proceeded to the northern tip of Door County Peninsula where a crossing was made by ferry boat to Washington Island. A Scandinavian fish broil was enjoyed by all, courtesy of Edward H. Anderson Farm, prior to a tour of the Anderson Farm potato growing operations on the Island.

MADISON MEETINGS

Registration for the annual meeting of the Potato Association of America, as well as 18 other affiliate and associate societies of A.I.B.S., was on September 5 and 6. The total registration for the Potato Association meetings was 129. A program of scientific papers got under way on Monday morning, September 7, and continued through September 9.

Forty-seven papers were presented in the Potato Association sessions; for the first time since World War II it was necessary to arrange concurrent sessions to accommodate the papers offered. Twelve papers were in joint session with the American Society for Horticultural Science and six were in joint session with the American Phytopathological Society and A.I.B.S. The program included three symposia: 1. Potato Viruses, 2. Potato Late Blight Resistance, and 3. Cooperative Agricultural Research in the Western Hemisphere (Joint with A.P.S. and A.I.B.S.). Judging from the many favorable comments, the symposia were especially well-received.

On Monday evening, September 7, the annual banquet of the Potato Association was held in Tripp Commons of the Memorial Union Building. Four members were honored with Life Memberships in the Potato Association of America. (Note: December, 1953, issue of the American Potato Journal). Attendance at the banquet was 123.

This is the second year that the Association has met with A.I.B.S. at one of the larger universities (Cornell, 1952). Each year the meeting date has been scheduled in early September and, of course, conflicts with potato harvesting operations in most northern areas. The disadvantages and inconveniences of holding the annual meeting at such a time cannot be overlooked. Most members who have attended the last two meetings agree, however, that there are many desirable features associated with meeting on a university campus in conjunction with several other scientific societies.

OBSERVATIONS ON POTATO MARKETING IN EUROPE

T. J. LOCKWOOD[1]

At the invitation of the Secretary of the International Potato Congress at Hamburg, Germany, I was guest speaker at the evening meeting and also showed slides and motion pictures of harvesting and packing potatoes both here and in South America.

This meeting was attended by approximately 800 people, all potato exporters and buyers from various parts of Europe. There are many things to see in Europe when one is interested in potatoes and covers it with potato men, and I will try to outline the items that I feel will be of great interest to the American potato industry.

I wish to point out that we have problems here, but we would think that our problems were very great if there were approximately eight to ten different languages spoken at one meeting, and every country trying to do business with the other; however, they seem to be used to it, and get along very well. What makes it easier, nearly all export business throughout the world is normally done in the English language; in other words, when a German is exporting potatoes to Argentina, he writes in English and uses the American dollar as a figure of exchange. So when an American does go to Europe to do business as we are doing, it is much easier to get a clear picture of the over-all operation.

GERMANY

Due to the large volume of potatoes grown, all trading is done in tons in place of hundred pound sacks. During the past year, Germany raised approximately 25 million long tons of potatoes. Consumption of the potatoes was as follows: 6 million tons to the people in general; 2 million consumed on the farm; 2 million used as seed potatoes; and approximately 13 million tons were cooked and used as stock feed, mostly for hogs. The balance of the crop was exported or used by starch plants.

Normally potatoes are cheaper in Germany than any other country of Europe. However, this year they are quite high. The price for potatoes was $2.25 for 110 pounds, over a 2-inch screen, in new sacks, for delivery to the Occupation Army. Farmers were paid $1.50 over 1¼" screen in the rough grade. The starch plants were paying $1.00 per hundred. Retail merchandising of potatoes in Germany is almost non-existent. Possibly one-half of 1 per cent is put into small paper sacks. There has been no potato washing done in Germany to the present time. Most of the potatoes have been hauled from the farm and sacked or hauled in bulk to the small stores and sold to the consumers. There have been no displays of potatoes whatsoever in the stores. However, other fruits and vegetables were displayed in the stores in a manner similar to many of our stores.

The farm storages in Germany which are built of brick, look very much like many of our storages in the East; however, many of the potatoes are stored in windrows in the fields, similar to what we did here a number of years ago. During the past two years, Germany has started to export potatoes to other countries and is creating a very good business

Accepted for publication April 30, 1954.

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— for this reason — they are becoming very interested in installing washers in Europe, however, it looks as if Germany may take the lead in recovery. We are shipping a complete washing plant to Germany, together with special sizers and 10-pound sacking units. We expect to put a number of other units there within the present year. After that, we believe they will build them there, and their import license will be so high that American manufacturers cannot ship there. They have a very good supply of dry grading and elevating equipment in their warehouses, and on their farms. All picking tables are of the slat-type, and all sizers of the old shaker-type.

Wages in the potato-grading plant vary from 20 to 25 cents an hour for women, and 30 to 32 cents per hour for men. They operate on a normal 48-hour week basis. The employer also pays a high rate of Social Security. One filling station attendant, working near a large potato warehouse, was paid $15 a week for a 60-hour week.

HOLLAND

Potatoes are one of the main crops in Holland. They export more potatoes than any other country in Europe. They do a very good job of selling seed potatoes. Many of their varieties are disease-free. They seem to have a better operation in some cases than we have in America. There is one thing that would be very interesting to the seed growers in this country. They have many warehouses in Holland, all of which are double-glassed; doors, sides, and roof. They store thousands of boxes of seed in these buildings. Boxes are about 2 feet long, 15 inches wide and 3 inches deep. The seed is very small. By doing it this way, they keep down the sprouts, kill disease, and give a very strong seed piece to plant in the soil, which has been used for potatoes for hundreds of years. Some of the other seed houses, for export business, however, are of brick and all of them are above ground and very modern. Generally the potatoes are stored in windrows, about five feet high. They grow approximately one-third of what we do in America. Thirty per cent of these go to the starch plants; quite a few are used for feed; and the balance for table stock or for export.

Most of the potatoes are planted in 20- to 24-inch rows, and a great many are check-planted in 20-inch squares. Many of the potato vines are pulled by hand to prevent disease and keep the potatoes just the right size for seed. Many are dug by hand, and some are harvested with single-row diggers.

When it comes to marketing the table potatoes in Holland, the buyer will go out to the farm and offer the farmer a definite amount for his potatoes. At this time, it was $2.00 per hundred for the clay land potatoes, graded over a shaker-type grader with the cuts and rots out. The buyer would furnish the sack and haul them to the railroad cars. At this point the buyer would dump them in the car loose, and ship them to the brokers in the cities. There they were again re-sacked by hand and taken around to the small grocery stores and delivered in sacks. This year, potatoes were higher at this time than they have been for many years. The retail price varied from $2.60 to $2.75 whereas sand-land potatoes for export sold for $1.12 in the bulk. The starch plants were paying 75 cents a hundred, but they closed down in December.

Until this last year, there was no packaging or merchandising of the table stock potatoes in Holland. We installed the first complete washer and grading plant in Nieuw Amsterdam, Holland, last year in July which was the first one in Europe. This is going to give them an opportunity to get back some of their export business that they have been losing because of the dirty potatoes which are raised there. Many will say that they should not wash their potatoes. This is probably true in a few cases, however, they are prepacking other fruits and vegetables and squeezing the potato farmer off the market, similar to what has happened to the potato industry in America.

At this time they have a polyethylene plant making bags in Holland and are also just starting to make the open mesh window bags.

The average pay in the potato industry for labor varies from $15.00 to $18.00 per week. They have a very high Social Security charge for the employers to pay.

One unique business policy that they have in Holland is that many potato shippers meet every Monday morning from 11 to 1 o'clock. The average attendance is from 700 to 800 people. They meet in Rotterdam in one of the largest buildings of this type in western Europe . . . all completely glass roofed. At the same time this meeting is being held, in the other end of the room, 800 to 1000 people are meeting on grain business. Most of these people in the meeting are shippers from Holland, but there are always representatives from near-by countries. This room has a complete telephone exchange and telegraph office, the center of which is totally enclosed in glass. There are small booths all around the room with four, colored signal lights for each, which are used to call attention to different groups. All telephones, in connection with produce trade, are equipped with extra ear phones.

FRANCE

There is a great deal of prepacking being done in France on all types of produce other than potatoes. They have a polyethylene factory in Paris and are even wrapping bread in polyethylene bags. No where else in the world, except America, have we seen bread wrapped or sacked.

The potatoes are handled very much the same in France as they are in Holland. However, since France has a colony in Algiers, they get new potatoes at this time of the year, and all potatoes of Algiers are washed and shipped to France in 60-pound sacks with paper lining.

At the time I was there, these potatoes were selling out of the retail stores for 13 cents a pound whereas the home-grown in Paris were selling for 4 cents a pound. The farmer was being paid $3.00 a hundred for potatoes graded over a shaker-type grader — 1¼″ minimum, with the sacks furnished by the buyer. The law regulates one-half cent a hundred margin of profit for the retailer, and the other one-half cent for the broker and freight. However, all the freight charges are very cheap in Europe, because of the short distances.

France raises approximately 12½ million long tons of potatoes, and they are consumed as follows: 43 thousands tons sent to starch plants; 116 thousand tons imported; 86 thousands tons exported; and the balance for home use, seed or feed.

Living costs in Paris are very high. The normal wage for men and women working in the potato industry is 45 cents per hour for men and for women, 40 cents. The employer has to pay 50 per cent more of that to the Government in the form of Social Security.

There are a number of grader factories in France, and these factories export a large number of machines to North Africa.

ITALY

There is no merchandising of any type on potatoes in Italy, other than a few near the large cities . . . a few in Rome are washed by hand in tubs and displayed on the market. The quality of their potatoes was very good, both in the red and white varieties. The wholesale price for new potatoes grown near Rome was 3 cents per pound in bulk. In the markets, they are displayed both in crates and burlap sacks. Italy is the only country, outside of Argentina, where we were not permitted to take a picture in the markets or visit their market without permission. This required a day's time, in Rome, to get permission to get into the city market. And every one who goes in or out of the market is checked. Any one taking produce out has a slip for each item of produce which he leaves with the police at the gate. The market in Rome is very large and nearly every type of produce is available.

SWEDEN

I did not visit Sweden, however, it is the only country which is building an automatic 10-pound sacking unit. Our information is that 80 per cent of the potatoes are being sold in small packages, because of the large supply of wood pulp. Nearly all the potatoes are sacked by Farmers Co-operatives.

ALGIERS

Because of the large export business from North Africa to central Europe, all of their fruit and produce is washed and packed very well. Their equipment for oranges and grapefruit equals what we have in Florida. The potatoes are not graded nearly so well as in America, but all of them are washed and packed in 60-pound sacks.

The general wage scale in the potato industry is $3.00 per day. At the time the harvest was just starting on new potatoes, the farmer was getting up to $7.00 per hundred in the field. They were selling on the market in Algiers for approximately $8.00 a hundred for new, red potatoes. Old potatoes were selling for about one-half that amount.

In summing up the potato industry of Europe, they raise a great deal more than we do and always talk in terms of tons because of the volume. Their problems in regard to disease are much greater than ours. In Holland, to protect their seed potatoes, they pull thousands of acres of vines by hand to prevent the disease and blight from going into the tuber or to prevent the tubers from getting too large to make good seed.

Their method of taking part of their crop when they have a surplus year and diverting it to hog feed and starch plants gives the farmer a fairly steady price. This year, however, because of the shorter than normal crop in Europe, the price was very high.

We were treated very courteously at all times in Europe, and I believe I was much more able to get a clearer picture of conditions there since I was on a business trip rather than being a tourist.

We were with potato growers all the time, and in Holland where I spoke before a large group of Government officials and shippers. I was able to speak in English, as most businesses in Holland have some one in the office who can speak English because of the large amount of export business.

We installed the first waxer in Holland this past month and the purpose is, to test the waxing of seed potatoes with a paraffin-base wax with the idea of helping them to keep better for exporting over the Equator to South America, because, at present, they have considerable trouble.

I believe it will be some time before they will have a lot of prepacking in Europe because the little peddler going around the streets is able to bring the potatoes directly to the home and very few housewives have a car to drive to a central market to do their shopping, such as we do here. Also, in most of the countries of Europe, the small sack is quite expensive.

Of the countries we visited, I believe Germany is doing the most business in exporting and rebuilding; in fact, I believe they are so busy they don't have time to worry about all the news that we read in our newspapers.

I feel that we have made a mistake of making big gifts to some countries. It is true, we needed to help them when they were down, but once they are on their feet, they prefer to do business on a business basis, and I can assure you they know how to look out for themselves when it comes to doing business. They have a great respect for some one who can do business with them on a business basis, and give them service, particularly in Germany and Holland where we have shipped equipment.

MINUTES OF EXECUTIVE COMMITTEE AND ANNUAL BUSINESS MEETINGS OF THE POTATO ASSOCIATION OF AMERICA

Annual Meeting of the Executive Committee, September 6, 1953. Memorial Union Building, Madison, Wis., 9:30 A.M. to 10:30 P.M.

Members Present: J. H. Muncie, G. H. Rieman, Ora Smith, N. M. Parks, Arthur Hawkins, R. W. Hougas, J. C. Campbell and C. W. Frutchey. Also F. A. Krantz, F. J. Stevenson and D. C. Cooper.

Members Absent: Paul Eastman and Wm. H. Martin.

1. *Membership and Subscriptions,* Discussion and Action

A. Regular Members — ($4.00)

Committee agreed that $4.00 rate was adequate. It was pointed out by Campbell, however, that (1) many subscriptions, especially those of public institutions and foreign workers, are made through commercial subscription agencies and that (2) the Potato Association receives $3.50 for each subscription made through such agencies (50¢ of each subscription goes to subscription agency).

Motion:

Moved by Rieman that the subscription rates of the Journal to public institutions and to foreign subscribers outside the North American continent be raised in accordance (percentage-wise) with the rates charged by other Journals.

Seconded by Campbell. Motion carried.

Note:

Campbell later reported to the Committee, after conferring with officers of Phytopathology on this subject, that the Post Office objects to and wishes to discontinue shipment of matter at the second-class rate if such matter is presented for sale at more than one price.

B. Gratis Copies of the Journal

It was pointed out by Campbell that several libraries, institutions and certain private individuals have been and are now receiving courtesy copies of the Journal. It was the consensus of opinion among the Executive Committee that this practice should be discontinued.

C. Membership Drive

Hawkins reported the results of the past year's membership drive. A form letter was prepared and was distributed in some states. These letters have been recently distributed and their effectiveness in increasing membership can not be measured at this date.

Several members of the Committee expressed the opinion that a personalized approach seems to be most productive in obtaining new members.

D. Sustaining Members ($100.00)

The current issue (July, 1953) of the Journal lists fifteen sustaining members of the Potato Association of America. The Committee expressed appreciation, on behalf of the Association, to J. H. Muncie, G. H. Rieman and J. C. Campbell for obtaining these members. Arthur Hawkins stated that two additional sustaining memberships will be obtained within the next month.

E. Group Members ($1.00)

In the discussion of group memberships, it was pointed out that:

(1) The number of group members has dropped
(2) The decline in group membership seems likely to continue
(3) The group memberships, as such, do not provide a profit to the Association
(4) The group members (705 in number at present) are important to the Association from the standpoint of advertising in the Journal (most of the group members are growers).

F. Honorary Life Members

It was the opinion of the Committee, following a review of Honorary Life Membership by G. H. Rieman, that the electoral body should be somewhat larger than the nine members of the Executive Committee. Accordingly, the following electoral body was proposed and accepted:

Electoral Body for Honorary Life Membership in The Potato Association of America —

10 past Presidents of P.A.A., as chosen by the Chairman of the Honorary Life Membership Committee from the list of past Presidents since 1924.
9 Executive Committee Members of P.A.A.

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19

2. *Affiliation of P.A.A. with A.I.B.S.*

The Association has met twice with A.I.B.S. (Ithaca, N. Y. and Madison, Wis.). The P.A.A. became affiliate members of A.I.B.S. in 1943 (not an affiliate at Ithaca). An affiliate membership in A.I.B.S. costs $100.00 annually. It was the opinion of the Executive Committee that the Association should continue to affiliate with A.I.B.S.

The 1954 A.I.B.S. meeting will be held in Gainesville, Fla.

3. *Advertising*

There was considerable dissatisfaction by the Committee with the present handling of advertising in the Journal. It was pointed out that the American Potato *Yearbook*, which *is not* a publication of the Association, enjoys much heavier advertising than does the official organ of the Association, the American Potato *Journal*.

Motion:

It was moved by G. H. Rieman that:

(1) The Potato Association of America terminate the services of the present advertising manager, Mr. C. S. MacFarland, Jr.
(2) The Association cease to sponsor or endorse the American Potato *Yearbook*
(3) The Association publish a supplement to The American Potato *Journal* (this supplement to cover such features as are covered in the *Yearbook*)
(4) Items 1 & 2 effective as of September 7, 1953.

Seconded by N. M. Parks, Motion carried.

J. C. Campbell moved meeting be adjourned, seconded by N. M. Parks, motion carried.

Respectfully submitted,
R. W. Hougas, Secretary.

MEETING OF THE EXECUTIVE COMMITTEE

September 8, 1953, 9:00 P.M., Mechanical Engineering Building, Madison, Wis.

Present: J. W. Scannell, J. H. Muncie, J. C. Campbell, G. H. Rieman, C. W. Frutchey, A. Hawkins, R. W. Hougas, N. M. Parks.

Absent: Paul Eastman, Wm. H. Martin.

Motion:

It was moved by C. W. Frutchey that:

(1) The Association employ a new advertising manager for the Journal and for the proposed supplement to the Journal

(2) The Association pay J. C. Campbell for assembling and editing the supplement to the Journal (actual amount of pay to be determined at a later date).

Seconded by R. W. Hougas, motion carried.

C. W. Frutchey moved meeting be adjourned. Seconded by A. Hawkins. Motion carried.

Respectfully submitted,
R. W. Hougas, Secretary.

POTATO ASSOCIATION OF AMERICA
ANNUAL BUSINESS MEETING

Room 105 Mechanical Engineering Building, University of Wisconsin, Madison, Wis., September 8, 1953. 9:15 A.M.

Meeting called to order by President J. H. Muncie.

The secretary's report was presented by R. W. Hougas. Report accepted.

J. C. Campbell presented the Treasurer's report. Report accepted. Copy is attached.

The Auditing Committee's report was presented by H. M. Darling. Report accepted.

The Editor's report presented by J. C. Campbell. Report accepted.

Report of the Membership Committee presented by O. C. Turnquist. Report accepted. Copies of form letter for soliciting membership and current list of membership in Association attached.

Arthur Hawkins presented the report of the Sustaining Membership Committee. The Association had fifteen sustaining members as of August 1, 1953. Report accepted. Sustaining member data sheets are attached.

Report of the Honorary Life Membership Committee presented by G. H. Rieman. Report accepted.

The Executive Committee report was presented by the Secretary. Report accepted. Copy attached.

Motion:

It was moved by Marx Koehnke that a notice be placed in the Journal stating that the Potato Association of America no longer sponsors or endorses the American Potato *Yearbook*.

Seconded by O. C. Turnquist. Motion carried.

Report of the Potato Introduction Committee was presented by R. W. Hougas. Report accepted. Copy of report attached.

J. W. Scannell presented the report of the Certification Committee. Report was accepted and it was recommended that this report be published in the Journal. Copy of report attached.

The Nominating Committee's report was presented by F. A. Krantz. Nominations:

President, J. W. Scannell; Vice President, Arthur Hawkins; Treasurer, J. C. Campbell; Director (3 years), Paul Eastman.

Report accepted.

President Muncie called for nominations from the floor. Arthur Hawkins was nominated for President and J. W. Scannell was nominated for Vice President.

Upon vote by ballot, the following members were elected:

President	J. W. Scannell
Vice President	Arthur Hawkins
Treasurer	J. C. Campbell
Director (3 years)	Paul Eastman

N. M. Parks presented the report of the Resolutions Committee. The Association expressed appreciation to:

(1) Drs. R. H. Larson, R. W. Hougas, G. H. Rieman and Mr. R. W. Ross for the field meeting at Eagle River and Sturgeon Bay.

(2) Drs. R. W. Hougas, G. H. Rieman, R. H. Larson and K. C. Berger for arrangements concerned with the annual meeting of the Association at Madison, Wisconsin. Report accepted. Copy of Resolutions attached.

Motion:

It was moved by O. C. Turnquist that the Potato Association of America remain an affiliate member of A.I.B.S. Seconded by J. C. Campbell. Motion carried.

Motion:

C. W. Frutchey moved that:

(1) The Potato Association meet with the American Phytopathological Society in Colorado during 1954, if possible.

(2) The Executive Committee be empowered to explore the possibilities of (1) and arrange the necessary details concerned therewith. Seconded by H. O. Werner. Motion carried.

Respectfully submitted,
R. W. Hougas, Secretary.

Subsequent to the action taken by the Executive Committee: 1, to dispense with Mr. Macfarland's services as our advertising manager effective immediately (September 7, 1954) and 2, to publish our own Supplement or Yearbook containing information similar to that in the present Yearbook; it was thought by several members of the committee that these actions were taken too hastily and without due consideration and should be reconsidered. Consequently, in November a vote was taken by mail on these two motions and both actions were reversed by a vote of five to two with one indefinite vote. Since this action superceded the motions passed at the annual meeting, Mr. Macfarland's services have been continued and we will not publish our own Yearbook in 1954.

It should be made clear, however, that The Potato Association of America does not endorse or sponsor the current issue of the American Potato Yearbook which is published by C. S. Macfarland, Jr.

PLASTICS HELP SELL POTATOES[1]

Long relegated to grocery store bins and brown paper bags, potatoes are being glamorized by many packers making imaginative use of the new polyethylene plastic packaging materials. (Figure 1)

To the delight of grocery store operators, many potato industry packers are putting up their spuds in 5 and 10-pound polyethylene bags, often brightly printed in two or three colors. This not only attracts shoppers who like the strong, convenient packages, but helps solve storage problems and gives grocers a chance to display potatoes effectively for the first time.

Consumer acceptance has proved exceptionally good, with surveys indicating a 10-to-1 preference among housewives for potatoes packaged in polyethylene. Grocers stocking the packaged potatoes report marked increases in sales.

One of the materials being most widely and successfully used is VisQueen "C," a polyethylene film made by The Visking Corporation, Terre Haute, Indiana. The film is treated to take and retain color printing brilliantly. Packers have already taken advantage of this by printing potato recipes and health factors on the bags. They also are experimenting with Kodachrome prints such as a full-color of an open baked potato complete with dripping butter.

Development of polyethylene film has made the packaging revolution possible. Unusually strong, it is chemically inert, not subject to damage through temperature change, nontoxic and tear-resistant. One of the biggest advantages is that it can be perforated for ventilation, an important factor in potato packaging, without being weakened.

Some packers using polyethylene are employing a translucent brown film for unwashed potatoes because it resists greening and eliminates the appearance of dust clinging on the bag. However, washed potatoes are packaged in a clear film because of the visibility factor, resulting in obvious display advantages.

One packer, using automatic equipment manned by three operators, packaged 600 five-pound packages per hour and 400 ten-pound packages.

Most packagers use bags approximately 6 x 3 x 18 inches for five-pound and 8 x 3 x 20 inches for ten-pound lots.

The individual packages, in turn, are packed either in wooden boxes containing ten 5-pound or five 10-pound units each or in heavy Kraft bags for easy shipment and storage.

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[1]Accepted for publication April 29, 1954.

Prepared by Irwin K. Teven, The Public Relations Board, The Visking Corporation, 75 East Wacker Drive, Chicago, Ill., for the American Potato Journal.

FIGURE 1.—Plastic bags such as these increase consumer appeal.

Fast-Reading EXACT WEIGHT Scales Speed Potato Packaging, Boost Profits

With a fast-weighing, fast-reading EXACT WEIGHT Scale, one operator can package, weigh, and check — all in one operation. An adjustable damping device brings scale indicator to rest quickly, and magnified indication enables operator to make an accurate reading at a glance. The seconds clipped off each weighing operation plus the saving from elimination of over-weights add dollars to your profits. In an astonishingly short time the savings can pay for the installation. Write for complete details.

There is no substitute for Exact Weight

Exact Weight Scales

Better quality control
Better cost control

THE EXACT WEIGHT SCALE COMPANY

921 W. Fifth Avenue, Columbus 8, Ohio
2920 Bloor St. W., Toronto 18, Canada

To fight potato blights **fast**— and get more No. 1's to the acre

HENRY H. EYRICH
Yellow House, Pa.,
who produced top potato yield in the state during 1953, says:

"I have been using DITHANE in my potato spray program for 5 years. I depend upon DITHANE for crop protection. This year it was in my potato program and it helped me produce the top yield in Pennsylvania of 748+bu./acre." Mr. Eyrich's faith in DITHANE to help him harvest high yields is also shared by growers wherever potatoes receive good blight control. Results as to yields vary from place to place—but this much can be said: From Prince Edward Island to Florida—and all the way to California—in all the important potato areas—DITHANE-protected vines increase yields, produce more No. 1's to the acre, help give farmers a better return on their investment of time, labor and money.

CHEMICALS FOR AGRICULTURE

ROHM & HAAS COMPANY

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